

CLAIMS

I Claim:

- 1 1. An optoelectronic semiconductor package device, comprising:
2 a semiconductor chip that includes an upper surface and a lower surface, wherein the
3 upper surface includes a light sensitive cell and a conductive pad;
4 an insulative housing that includes a first single-piece non-transparent insulative housing
5 portion that contacts the lower surface and is spaced from the light sensitive cell and a second
6 transparent insulative housing portion that contacts the first housing portion and the light
7 sensitive cell; and
8 a conductive trace that extends outside the insulative housing and is electrically
9 connected to the pad inside the insulative housing.
- 1 2. The device of claim 1, wherein the first housing portion contacts four outer side
2 surfaces of the chip.
- 1 3. The device of claim 1, wherein the first housing portion is spaced from the upper
2 surface.
- 1 4. The device of claim 1, wherein the second housing portion contacts the
2 conductive trace.
- 1 5. The device of claim 1, wherein the second housing portion is spaced from the
2 lower surface.
- 1 6. The device of claim 1, wherein the first housing portion includes a peripheral
2 ledge, and the second housing portion is located within the peripheral ledge.
- 1 7. The device of claim 1, wherein the first housing portion is a transfer molded
2 material, and the second housing portion is a cured polymeric material.

1 8. The device of claim 1, wherein the conductive trace extends through a peripheral
2 side surface of the first housing portion and contacts the second housing portion without
3 extending through a surface of the second housing portion.

1 9. The device of claim 1, wherein the device is devoid of an electrical conductor that
2 extends through a surface of the second housing portion.

1 10. The device of claim 1, wherein the device is devoid of wire bonds, TAB leads and
2 solder joints.

1 11. An optoelectronic semiconductor package device, comprising:
2 a semiconductor chip that includes an upper surface, a lower surface and outer side
3 surfaces between the upper and lower surfaces, wherein the upper surface includes a light
4 sensitive cell and a conductive pad;
5 an insulative housing that includes a first single-piece non-transparent insulative housing
6 portion that contacts the lower surface and the side surfaces and is spaced from the upper surface
7 and a second transparent insulative housing portion that contacts the first housing portion and the
8 light sensitive cell and is spaced from the lower surface; and
9 a conductive trace that extends outside the insulative housing and is electrically
10 connected to the pad inside the insulative housing.

1 12. The device of claim 11, wherein the second housing portion includes first and
2 second opposing surfaces, the first surface contacts the light sensitive cell and the conductive
3 trace, and the second surface faces away from the chip and is exposed.

1 13. The device of claim 11, wherein the first housing portion includes a peripheral
2 ledge, and the second housing portion is located within the peripheral ledge.

1 14. The device of claim 13, wherein the second housing portion is recessed relative to
2 the peripheral ledge.

1 15. The device of claim 11, wherein the first housing portion is a transfer molded
2 material, and the second single-piece housing portion is a cured polymeric material.

1 16. The device of claim 11, wherein the insulative housing consists of the first and
2 second housing portions.

1 17. The device of claim 11, wherein the first housing portion is a transfer molded
2 material that includes a peripheral ledge, and the second housing portion is a cured polymeric
3 material that is located within the peripheral ledge and includes a first surface that contacts the

4 light sensitive cell and the conductive trace and a second surface opposite the first surface that
5 faces away from the chip and is exposed.

1 18. The device of claim 11, wherein the conductive trace extends through a peripheral
2 side surface of the first housing portion and contacts the second housing portion without
3 extending through a surface of the second housing portion.

1 19. The device of claim 11, wherein the device is devoid of an electrical conductor
2 that extends through a surface of the second housing portion.

1 20. The device of claim 11, wherein the device is devoid of wire bonds, TAB leads
2 and solder joints.

1 21. An optoelectronic semiconductor package device, comprising:
2 a semiconductor chip that includes an upper surface, a lower surface and four outer side
3 surfaces between the upper and lower surfaces, wherein the upper surface includes a light
4 sensitive cell and a conductive pad;
5 an insulative housing that includes a top surface, a bottom surface and peripheral side
6 surfaces between the top and bottom surfaces, wherein the insulative housing further includes
7 first and second insulative housing portions, the first housing portion is a single-piece that
8 provides the bottom surface and is non-transparent, and the second housing portion contacts the
9 upper surface, provides at least a portion of the top surface and is transparent; and
10 a conductive trace that extends outside the insulative housing and is electrically
11 connected to the pad inside the insulative housing.

1 22. The device of claim 21, wherein the first housing portion contacts the lower
2 surface and the outer side surfaces and is spaced from the upper surface.

1 23. The device of claim 21, wherein the second housing portion contacts the light
2 sensitive cell and the conductive trace and is spaced from the lower surface.

1 24. The device of claim 21, wherein the first housing portion includes a peripheral
2 ledge that forms a peripheral portion of the top surface, and the second housing portion is located
3 within and recessed relative to the peripheral ledge.

1 25. The device of claim 21, wherein the first housing portion is a transfer molded
2 material, and the second single-piece housing portion is a cured polymeric material.

1 26. The device of claim 21, wherein the insulative housing consists of the first and
2 second housing portions.

1 27. The device of claim 21, wherein the conductive trace and the light sensitive cell
2 contact a major surface of the second housing portion that faces towards and is parallel to the
3 upper surface.

1 28. The device of claim 21, wherein the device is devoid of an electrical conductor
2 that extends through the top or bottom surfaces.

1 29. The device of claim 21, wherein the device is devoid of an electrical conductor
2 that extends through a surface of the second housing portion.

1 30. The device of claim 21, wherein the device is devoid of wire bonds, TAB leads
2 and solder joints.

1 32. The device of claim 31, wherein the second housing portion includes first and
2 second opposing surfaces, the first surface faces towards the chip and contacts the light sensitive
3 cell and the conductive trace, and the second surface faces away from the chip and provides the
4 central portion of the top surface and is exposed.

1 33. The device of claim 31, wherein the peripheral portion of the top surface forms a
2 rectangular peripheral ledge, and the second housing portion is located within and recessed
3 relative to the peripheral ledge.

1 34. The device of claim 33, wherein the peripheral ledge includes four inner side
2 surfaces that are opposite the peripheral side surfaces and outside a periphery of the chip.

1 35. The device of claim 31, wherein the first housing portion is a transfer molded
2 material, and the second housing portion is a cured polymeric material.

1 36. The device of claim 31, wherein the insulative housing consists of the first and
2 second housing portions.

1 37. The device of claim 31, wherein the first housing portion is a transfer molded
2 material that includes a peripheral ledge, and the second housing portion is a cured polymeric
3 material that is located within the peripheral ledge and includes a first surface that faces towards
4 the chip and contacts the light sensitive cell and the conductive trace and a second surface
5 opposite the first surface that faces away from the chip and provides the central portion of the top
6 surface and is exposed.

1 38. The device of claim 31, wherein the device is devoid of an electrical conductor
2 that extends through the top or bottom surfaces.

1 39. The device of claim 31, wherein the device is devoid of an electrical conductor
2 that extends through a surface of the second housing portion.

1 40. The device of claim 31, wherein the device is devoid of wire bonds, TAB leads
2 and solder joints.

1 41. An optoelectronic semiconductor package device, comprising:
2 a semiconductor chip that includes an upper surface and a lower surface, wherein the
3 upper surface includes a light sensitive cell and a conductive pad;
4 an insulative housing that includes a top surface, a bottom surface and a peripheral side
5 surface between the top and bottom surfaces, wherein the insulative housing further includes a
6 first insulative housing portion that covers the lower surface and is non-transparent and a second
7 insulative housing portion that covers the light sensitive cell and is transparent; and
8 a conductive trace that protrudes laterally from and extends through the side surface and
9 is electrically connected to the pad, wherein the conductive trace includes a recessed portion that
10 extends through the side surface and is spaced from the top and bottom surfaces and a non-
11 recessed portion that extends outside the insulative housing and is adjacent to the recessed
12 portion and a corner between the side surface and the top surface.

1 42. The device of claim 41, wherein the first housing portion contacts the lower
2 surface and four outer side surfaces of the chip.

1 43. The device of claim 41, wherein the second housing portion contacts the light
2 sensitive cell and the conductive trace.

1 44. The device of claim 41, wherein the first housing portion includes a peripheral
2 ledge, and the second housing portion is located within the peripheral ledge.

1 45. The device of claim 41, wherein the first housing portion is a transfer molded
2 material, and the second single-piece housing portion is a cured polymeric material.

1 46. The device of claim 41, wherein the insulative housing consists of the first and
2 second housing portions.

1 47. The device of claim 41, wherein the conductive trace and the light sensitive cell
2 contact a major surface of the second housing portion that faces towards and is parallel to the
3 upper surface.

1 48. The device of claim 41, wherein the device is devoid of an electrical conductor
2 that extends through the top or bottom surfaces.

1 49. The device of claim 41, wherein the device is devoid of an electrical conductor
2 that extends through a surface of the second housing portion.

1 50. The device of claim 41, wherein the device is devoid of wire bonds, TAB leads
2 and solder joints.

1 51. An optoelectronic semiconductor package device, comprising:
2 a semiconductor chip that includes an upper surface and a lower surface, wherein the
3 upper surface includes a light sensitive cell and a conductive pad;
4 an insulative housing that includes a top surface, a bottom surface and a peripheral side
5 surface between the top and bottom surfaces, wherein the insulative housing further includes a
6 first single-piece housing portion that contacts the lower surface and is spaced from the light
7 sensitive cell and a second single-piece housing portion that contacts the first housing portion
8 and the conductive trace and is transparent, the first housing portion alone provides the bottom
9 surface, and the first and second housing portions in combination provide the top surface; and
10 a conductive trace that protrudes laterally from and extends through the side surface and
11 is electrically connected to the pad, wherein the conductive trace includes a recessed portion
12 inside the insulative housing that extends through the side surface and is spaced from the top and
13 bottom surfaces and a non-recessed portion outside the insulative housing that is adjacent to and
14 integral with the recessed portion and contacts the side surface and is adjacent to a corner
15 between the side surface and the top surface.

1 52. The device of claim 51, wherein the second housing portion includes first and
2 second opposing surfaces, the first surface contacts the light sensitive cell and the conductive
3 trace, and the second surface faces away from the chip and is exposed.

1 53. The device of claim 51, wherein the first housing portion includes a peripheral
2 ledge, and the second housing portion is located within and recessed relative to the peripheral
3 ledge.

1 54. The device of claim 53, wherein the peripheral ledge includes four inner side
2 surfaces that are opposite the peripheral side surfaces and outside a periphery of the chip.

1 55. The device of claim 51, wherein the first housing portion is a transfer molded
2 material, and the second housing portion is a cured polymeric material.

1 56. The device of claim 51, wherein the insulative housing consists of the first and
2 second housing portions.

1 57. The device of claim 51, wherein the first housing portion is a transfer molded
2 material that includes a peripheral ledge, and the second housing portion is a polymeric material
3 that is located within the peripheral ledge and includes a first surface that contacts the light
4 sensitive cell and the conductive trace and a second surface opposite the first surface that faces
5 away from the chip and is exposed.

1 58. The device of claim 51, wherein the device is devoid of an electrical conductor
2 that extends through the top or bottom surfaces.

1 59. The device of claim 51, wherein the device is devoid of an electrical conductor
2 that extends through a surface of the second housing portion.

1 60. The device of claim 51, wherein the device is devoid of wire bonds, TAB leads
2 and solder joints.